

1 **DIRECT TESTIMONY OF**

2 **ANDY T. BARBEE**

3 **ON BEHALF OF**

4 **SOUTH CAROLINA ELECTRIC & GAS COMPANY**

5 **DOCKET NO. 2012-2-E**

6
7 **Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION**
8 **WITHIN SOUTH CAROLINA ELECTRIC & GAS COMPANY (“SCE&G”**
9 **OR “COMPANY”).**

10 A. My name is Andy Barbee. My business address is P.O. Box 88,
11 Jenkinsville, South Carolina. I am employed by SCE&G as the Director of
12 Nuclear Training at the Virgil C. Summer Nuclear Station (“VCSNS” or “V.C.
13 Summer”).
14

15 **Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR**
16 **BUSINESS EXPERIENCE.**

17 A. After six years of service in the United States nuclear Navy, I began my
18 career in the electric utility industry in 1983 when Carolina Power & Light
19 Company (“CP&L”) (now Progress Energy) hired me to work at the Shearon
20 Harris Nuclear Station, which at that time was under construction. During my
21 tenure at CP&L from 1983 – 2005, I held several leadership positions at the
22 Shearon Harris Nuclear Station. More specifically, I worked as a licensed

1 operator training instructor, shift technical advisor, shift manager, superintendent
2 of operations support, and superintendent of operations training. While at CP&L,
3 I was granted a Senior Reactor Operator License in 1986 by the Nuclear
4 Regulatory Commission (“NRC”), and in 1993, I received a Bachelor of Science
5 degree in Nuclear Science from the University of Maryland.

6 In 2005, I became employed by Dominion Resources, Inc. (“Dominion”)
7 and worked at Dominion’s Surry Nuclear Power Station until 2009. During my
8 employment at Dominion, I served as the supervisor of operator training and the
9 training manager at Surry Nuclear Power Station.

10 In November 2009, I was hired by SCE&G to work at V.C. Summer as
11 Director of Nuclear Training. As SCE&G’s Director of Nuclear Training, I am
12 responsible for all training related activities at V.C. Summer, which includes the
13 new nuclear units under construction.

14
15 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

16 A. The purpose of my testimony is to review the operating performance of
17 VCSNS during the period from January 1, 2011 through December 31, 2011
18 (“Review Period”).

19
20 **Q. WHAT ARE SCE&G’S OBJECTIVES IN THE OPERATION OF VCSNS?**

21 A. SCE&G’s primary objective at VCSNS is safe and efficient operation. The
22 Company also strives for excellence in all phases of operation of the facility. The

1 station's key focus areas of SAFETY, reliability, outage and work management,
2 work force development, and organizational effectiveness constitute our core
3 business plan elements. SCE&G's constant improvement in these areas over the
4 years has facilitated VCSNS's outstanding service record. Furthermore, our
5 business objectives are focused on maintaining a competitive production cost for
6 the generation of electricity using nuclear fuel.

7
8 **Q. WHAT HAS BEEN THE COMPANY'S EXPERIENCE WITH THE**
9 **PERFORMANCE OF THE VCSNS?**

10 A. SCE&G continuously meets or exceeds all NRC requirements and Institute
11 of Nuclear Power Operations ("INPO") standards. VCSNS has performed well
12 during the Review Period. Consistent with the provisions of Section 58-27-865
13 of the South Carolina Code of Laws, as amended, V.C. Summer's net capacity
14 factor based on reasonable excludable nuclear system reductions during the
15 Review Period was 101.1%, and the gross generation output was 7,723,825
16 megawatt hours.

17
18 **Q. DID VCSNS EXPERIENCE ANY FORCED OUTAGES DURING THE**
19 **REVIEW PERIOD?**

20 A. Yes. During the Review Period, VCSNS experienced one forced outage.
21 On January 18, 2011, VCSNS was shut down in order to investigate and repair an
22 oil level indicator used in conjunction with the C reactor coolant pump motor.

1 The unit remained offline for approximately two days, returning to full service on
2 January 20, 2011.

3
4 **Q. PLEASE DESCRIBE THE CIRCUMSTANCES LEADING TO THE**
5 **FORCED OUTAGE OF VCSNS ON JANUARY 18, 2011.**

6 A. While VCSNS was in operation, plant operators received an indication that
7 the oil level in the reservoir for the C reactor coolant pump motor was at a higher
8 than normal level. This prompted SCE&G to investigate the matter while the
9 plant was on-line. During its investigation, the Company discovered that the oil
10 level indicator was not functioning properly because of oil accumulation in a bend
11 in a section of the vent pipe extending from the oil reservoir to the oil level
12 indicator. SCE&G also discovered during its investigation that the oil level in the
13 reservoir was lower than normal. Due to the radiological and industrial safety
14 concerns in the vicinity of the pump motor, the plant was taken off-line in order to
15 repair the bend in the piping and replenish the oil in the reservoir. The unit's
16 response to the shutdown was normal, and all systems responded as designed and
17 required.

18
19 **Q. WHAT MEASURES WERE TAKEN TO RETURN THE UNIT TO**
20 **SERVICE?**

21 A. SCE&G repaired the bend in the piping by removing the damaged section
22 of pipe and replacing it with new piping. The Company then replenished the oil

1 in the reservoir which is required periodically in the course of normal operations.
2 After repairing the piping and replenishing the oil supply, SCE&G then inspected
3 the oil level indicator for the A reactor coolant pump motor as well as the B
4 reactor coolant pump motor and found them to be in proper working condition.
5 VCSNS returned to service on January 20, 2011.
6

7 **Q. DID VCSNS EXPERIENCE ANY PLANNED OUTAGES DURING THE**
8 **REVIEW PERIOD?**

9 A. Yes. During the Review Period, VCSNS experienced one planned outage.
10 On April 14, 2011, the unit began to reduce its generation output in a controlled
11 manner and was shut down completely just before midnight on April 15, 2011, to
12 conduct V.C. Summer's 19th scheduled refueling outage ("RF19"). During this
13 outage, which lasted forty-five (45) days, the Company met all technical
14 objectives and completed scheduled maintenance activities. The reactor returned
15 to criticality on May 29, 2011, and the outage ended with the closure of the
16 generator breaker on May 31, 2011. The planned outage, scheduled for thirty-six
17 and one-half (36½) days, was exceeded by eight (8) days due, in part, to the
18 inclusion of the Alternate Seal Injection scope of work within the RF19 outage
19 work schedule and the limited amount of qualified, skilled-craft labor available at
20 the outset of the outage. The outage was completed with no nuclear safety
21 events.
22

1 **Q. PLEASE EXPLAIN THE KEY MAINTENANCE AND MODIFICATION**
2 **TASKS SCE&G ACCOMPLISHED DURING RF19.**

3 A. During the refueling outage, approximately one-third of V.C. Summer's
4 157 fuel assemblies were replaced, and scheduled maintenance work that cannot
5 be performed when the plant is in operation was conducted. During this time,
6 nearly 3,300 routine tasks including preventative maintenance, corrective
7 maintenance, and surveillance testing tasks were completed successfully.
8 SCE&G completed a number of key maintenance and modification tasks during
9 RF19, a few of which are described below.

- 10 • **Alternate Seal Injection.** Prior to the start of RF19, SCE&G included
11 an additional scope of work within its RF19 outage work schedule
12 which the Company had not included in its original work schedule
13 plans. Rather than wait until the next refueling outage, SCE&G elected
14 to begin installation of an Alternate Seal Injection during RF19. This
15 modification, which will be completed in refueling outage 20, provides
16 an alternate water source to cool the Reactor Coolant Pump ("RCP")
17 water seal. The pump for the alternate supply is powered by a diesel
18 generator so the cooling source is available during a loss of off-site
19 power. Adequate cooling of the RCP water seal ensures that the water
20 used to cool the reactor is preserved in the event of a loss of off-site
21 power. When completed, SCE&G anticipates that the Alternate Seal
22 Injection will improve estimated core damage frequency by 36%.

1 During INPO's biennial evaluation of V.C. Summer, INPO recognized
2 SCE&G's decision to install Alternate Seal Injection capability during
3 RF19 as showing a strong commitment to nuclear, radiological, and
4 industrial safety.

- 5 • **Digital Electro Hydraulic Control.** The electro hydraulic control
6 ("EHC") system for the turbine had become obsolete and had several
7 single point vulnerabilities. This prompted SCE&G to install a new
8 Digital EHC system. The new Digital EHC includes redundancy
9 thereby improving the reliability of the turbine control system.
- 10 • **Replacement of Main Generator Breaker.** This modification
11 improved the reliability of the main generator breaker, which had
12 caused unplanned outages in the past.
- 13 • **SW-EFW Cross Connect Cured in Place Piping.** This modification
14 improves reliability of the Emergency Feedwater system by installing an
15 interior lining. The lining inhibits biofouling of the inner pipe wall.
- 16 • **Main Generator Major Inspection.** This scope of work consists of
17 expanded preventative maintenance which is conducted on a three-year
18 frequency.
- 19 • **Replacement of "B" and "X" Batteries.** The periodic replacement of
20 these batteries ensures that important components and instruments
21 continue to operate in the event of power interruption.

1 **Q. WHEN WILL THE NEXT REFUELING OUTAGE OCCUR?**

2 A. Refueling outages are scheduled every 18 months to replace depleted fuel
3 assemblies. Maintenance and testing that cannot be done with the plant on-line
4 are also conducted during the refueling outage. SCE&G's next refueling outage,
5 Refueling Outage No. 20, is scheduled for October 12, 2012.

6
7 **Q. PLEASE EXPLAIN THE ROLES OF INPO AND THE NRC WITHIN THE**
8 **NUCLEAR INDUSTRY AND DESCRIBE ANY RANKINGS RECEIVED**
9 **BY VCSNS FROM THOSE AGENCIES.**

10 A. INPO is a nonprofit corporation established by the nuclear industry to
11 promote the highest levels of nuclear safety and plant reliability. INPO promotes
12 excellence in the industry in the operation of nuclear electric generating plants.
13 During the time period November 7, 2011 to November 18, 2011, INPO
14 conducted its biennial evaluation of V.C. Summer. For the applicable reporting
15 period, INPO rated VCSNS's overall performance as excellent.

16 The NRC is responsible for the licensing and oversight of the civilian use
17 of nuclear materials in the United States. During the Review Period, the NRC
18 reported that VCSNS operated in a manner that preserved public health and safety
19 and fully met all cornerstone objectives.

1 **Q. WHAT IS THE SPENT FUEL STORAGE CAPABILITY FOR VCSNS**
2 **AND WHAT IS THE PLAN FOR DEVELOPMENT OF A DRY FUEL**
3 **STORAGE FACILITY?**

4 A. V.C. Summer has sufficient capacity for spent fuel storage in the spent fuel
5 pool through the 23rd refueling outage in 2017. This allows capacity for a full
6 core off-load in addition to the spent fuel stored in the pool. The plant is already
7 developing plans for the construction of a dry fuel storage facility that will need
8 to be in service by 2015.

9

10 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

11 A. Yes.